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ings, defibrinations, and reinjections. The reformation of fibrinogen takes place normally in the absence of the spleen, the pancreas, the kidneys, the reproductive organs, and the brain; but only in very small amounts if the intestines be removed. Fibrinogen is not formed directly from the proteid constituents of the food, for it readily reforms after protracted fasting. If leucocytosis be prolonged for several days by suppurations, the fibrinogen of the blood increases. Fibrinogen is, therefore, probably produced by the decomposition of leucocytes, especially those of the intestinal area. As the fibrinogen of the blood brings about a contractile fibrillar structure in forming a clot, so possibly the fibrinogen of a cell such as a leucocyte may be connected with the formation of the contractile fibrils of the asters in cell division.

G. H. P.

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## ZOÖLOGY.

**The Rotifera.**<sup>1</sup>—In this, the first part of a proposed monographic treatment of the Rotifera, Lund gives the more general results of a study which has been conducted on a broad basis. The author has undertaken to examine the group from a purely objective standpoint, without regard to theories of the primitive nature of the organs of the animals, nor of the relationship of the Rotifera to other groups. The result is the most valuable contribution to the biology, morphology, and classification of the Rotifera that has appeared for many years.

Lund examines successively the principal structures that may be used in classification—the nature of the cuticula, the ciliary organ, the mouth parts, the foot, and the sense organs. A strictly objective comparative anatomical standpoint, unbiased by previous theories, is maintained in this study. The structures in question are traced in all their modifications and transitions throughout the group, and an attempt is made to discover the primitive condition of each, together with the path of evolution in the development of the more striking modifications. The œcological value of the organs is brought throughout into the closest relation with their structure. The result is a classification of the Rotifera differing widely from those based on preconceived ideas as to the relationship of this group to the Trochophora, or to other groups; a classification which

<sup>1</sup> *Denmarks Rotifera. I. Grundtraekkene i Rotiferernes Okologi, Morfologi og Systematik*, af C. Wesenberg Lund. Kjøbenhavn, 1899. 145 pp., 2 plates.

may, whatever its imperfections in detail, be truly called a natural one. In the successive examination of the structures above named, the fact is clearly brought out — a fact more or less patent to all who have worked extensively on the Rotifera — that all the widely separated members of the group are connected by transitional forms with the worm-like Notommatidæ. The latter form thus a central group, from which the others have diverged along different lines. Certain of the Notommatidæ present what must be looked upon as the primitive form of the structures in question — a soft cuticula; ciliary organ, consisting of a flat disk on the ventral side, covered with undifferentiated cilia; forcipate mouth parts, and two pairs of lateral sense organs. From this central group some six or seven lines of evolution in different directions are traced, each marked by successive changes from the primitive form of the organs above mentioned, in correspondence with the life habits of the animals.

These studies form the basis of the classification which follows. In this classification one or two points are worthy of especial mention. The division of the larger part of the Rotifera on the basis of the stiffness or softness of the cuticula into the two general groups, Loricata and Il-loricata, which has proved such a stumbling-block to a natural classification, is done away with. To the presence or absence of the foot little importance is attached. Whether one can or cannot agree in detail with the exact arrangement of the genera within the system as given, I believe it must be admitted that this is the nearest to a natural system of the group that has ever been given, and that it will be upon some such lines as these that the final classification of the Rotifera will be made.

The paper is one deserving of study by all students of the Rotifera. It is, moreover, a model for the way in which the general life relations of animals may be brought into correlation with their morphology and classification; as such it has claims on the interest of others beside the specialist in Rotifera. Unfortunately, the work is rendered somewhat less easily accessible in that it is written in the Danish language instead of in one of the four languages that form the recognized necessary linguistic equipment of the man of science.

H. S. JENNINGS.

**Segmentation of Insect Head.** — The segmentation of the insect head, as seen in the Collembola, has been studied by J. W. Folsom.<sup>1</sup>

<sup>1</sup> Folsom, J. W. The Segmentation of the Insect Head, *Psyche*, vol. viii, pp. 391-394. August, 1899.